

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

## SUPPLEMENTARY EXAMINATION

TRIMESTER 1, 2015/2016

**EEL1166 – CIRCUIT THEORY**  
( All sections / Groups )

17 NOV 2015  
9.00 AM – 11.00 AM  
(2 HOURS)

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### INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 6 pages with 4 Questions only.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.

**Question 1**

- (a) Using the Superposition Principle, determine the voltage,  $v_o$  in the circuit given in Figure Q1(a).

[11 marks]

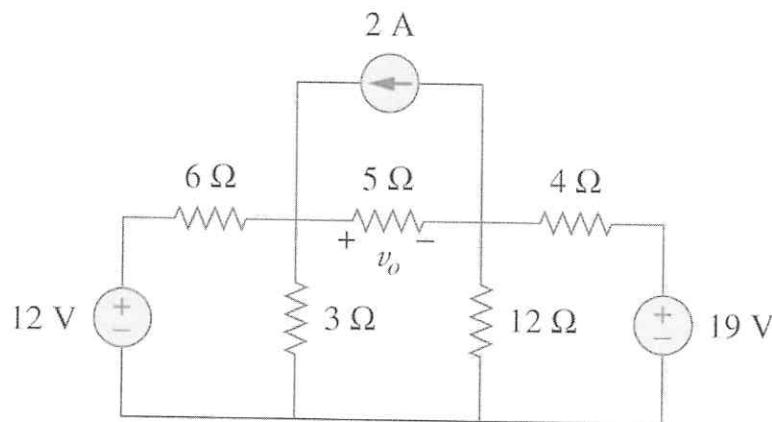


Figure Q1(a)

- (b) Using Norton's Theorem, determine the voltage,  $V_o$  in the circuit given in Figure Q1(b).

[14 marks]

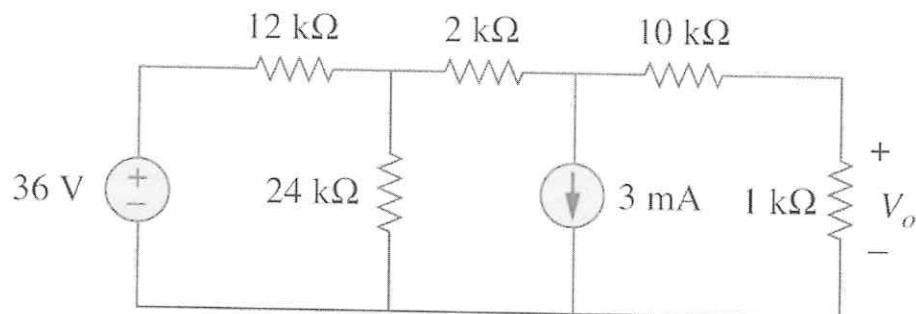


Figure Q1(b).

**Continued.....**

**Question 2**

- (a) Define ‘Periodic’ and ‘Aperiodic’ signals. Give an example for each.

[3 marks]

- (b) For the waveform shown in Figure Q2(b),

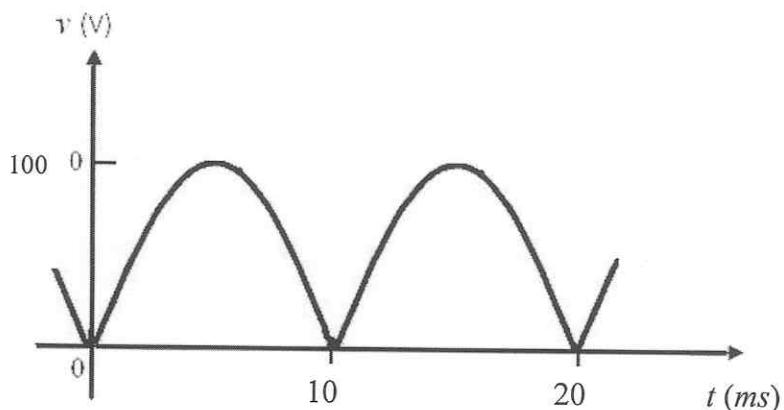


Figure Q2(b)

- (i) calculate the fundamental cyclic frequency, and

[1 mark]

- (ii) find the average value of the waveform.

[5 marks]

- (c) Use the node-voltage method to find the branch currents  $i_1$ ,  $i_2$  and  $i_3$  in the circuit of Figure Q2(c). Show that the power developed in the circuit is equal to the power dissipated.

[16 marks]

**Continued.....**

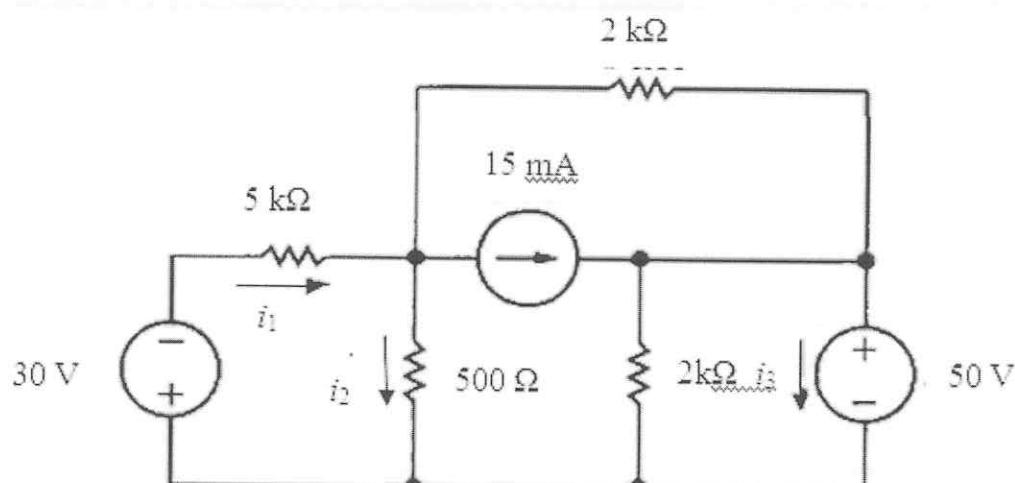


Figure Q2(c)

**Question 3**

(a) A linear bilateral circuit is shown in Figure Q3(a). Determine the following:

(i) total impedance,  $Z_T$ , and

[5 marks]

(ii) total current,  $I$ .

[2 marks]

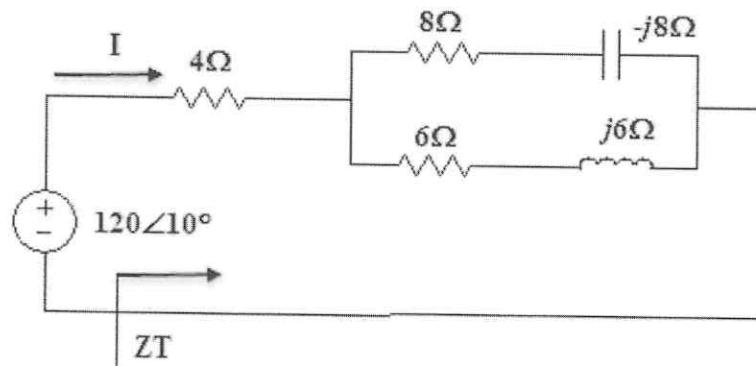


Figure Q3(a)

**Continued.....**

(b) The parallel *RLC* circuit is shown in Figure Q3(b). Determine the following:

- (i) total admittance of the circuit and express the result in polar as well as in rectangular form and also draw admittance diagram, [4 marks]
- (ii) total impedance of the circuit in polar form, and [2 marks]
- (iii) total *rms* current of the circuit. [2 marks]

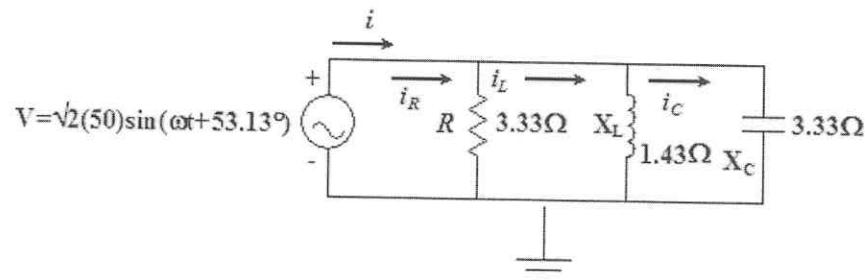


Figure Q3(b)

(c) A series sinusoidal Steady state *RLC* circuit is shown in Figure Q3(c). Given values are  $R = 20 \Omega$ ,  $L = 5 \text{ mH}$  and  $C = 3 \text{ pF}$ . Determine bandwidth, BW.

[10 marks]

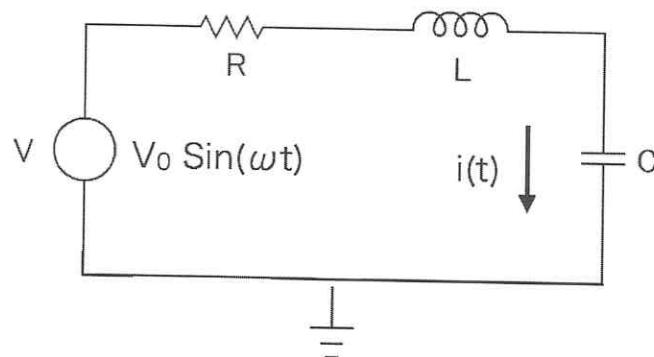


Figure Q3(c)

Continued.....

**Question 4**

- (a) Determine the capacitor voltage  $v(t)$  for  $t > 0$  in the circuit of Figure Q4(a). Assume that the switch was open for a long time.

[9 marks]

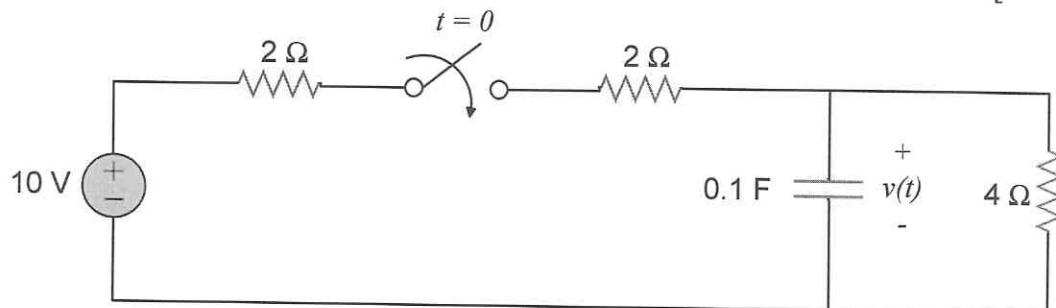


Figure Q4(a)

- (b) The switch in the circuit of Figure Q4(b) has been at position *a* for a long time. At  $t = 0$ , it moves to position *b*. Find  $v(t)$  for  $t > 0$  in the circuit of Figure Q4(b).

[16 marks]

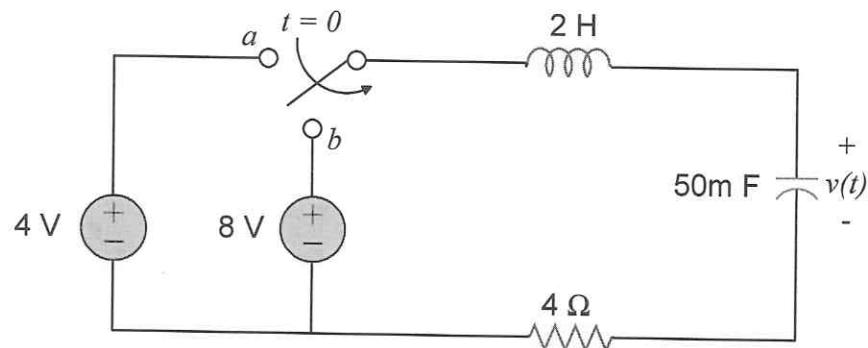


Figure Q4(b)

**End of paper**